

REMARKS

Claims 1-19 are pending in the present application. Claims 1-11 are canceled by this amendment, and new claims 12-19 are added. The claims to the polymer and catalyst composition have been deleted. The method claims have been amended to more clearly define the present invention. Accordingly no new matter is introduced into the application by way of this amendment. Entry is respectfully requested.

Abstract

At page 2 of the Office Action, the Abstract is objected to because it is not limited to a single paragraph. The Abstract has been corrected as requested by the Examiner. It is respectfully requested that this objection be withdrawn.

Claim Rejections – 35 U.S.C. §112

At page 2 of the Office Action, claims 1-10 are rejected under 35 U.S.C. §112, second paragraph, as indefinite. In claim 1 the Examiner asserts that the addition of "-type" to "metallocene" renders the expression indefinite. In claim 9, the Examiner asserts that use of the expression "can be" renders the claim indefinite.

The present claims no longer use the term "-type." Accordingly, withdrawal of this rejection is respectfully requested.

Claim 9 is cancelled in the present amendment which renders this rejection moot.
Withdrawal is respectfully requested.

Claim Rejections – 35 U.S.C. §102/§103

At pages 3-4 of the Office Action, claim 11 is rejected under 35 U.S.C. §102(b) as anticipated by WO 00/52062. For the following reason, this rejection is respectfully traversed.

Claim 11 is deleted in this amendment, rendering this rejection moot. Withdrawal of the rejection is respectfully requested.

At page 4 of the Office Action, claims 9-10 are rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative under 35 U.S.C. §103(a) as obvious over, WO 00/52062. For the following reason, this rejection is respectfully traversed.

Claims 9-10 are canceled in this amendment, rendering this rejection moot. Withdrawal of the rejection is respectfully requested.

At pages 5-7 of the Office Action, claims 1-8 are rejected under 35 U.S.C. §103(a) as unpatentable over WO 00/52062 (with all references made to U.S. 6,595,828, the English language equivalent). For the following reasons, this rejection is respectfully traversed.

As an initial matter, it is noted that the structure of the catalyst presently claimed is the substituted cyclopentadienyl group represented as C_5Me_4R wherein Me = methyl, and R = a hydrocarbon group, but $R \neq Me$.

In WO 00/52062 the following groups are mentioned as the substituted cyclopentadienyl group of the catalyst: 1-ethyl-2, 3, 4, 5-tetramethylcyclopentadienyl group, 1-benzyl-2, 3, 4, 5-tetramethylcyclopentadienyl group, 1-phenyl-2, 3, 4, 5-tetramethylcyclopentadienyl group, and 1-trimethylsilyl-2, 3, 4, 5-tetramethylcyclopentadienyl group. See U.S. 6,595,828 col. 5, lines 8-11.

However, in WO 00/52062 there are no working examples using these substituted groups which show their catalyst activity, nor are any of these groups mentioned as preferred. See U.S. 6,595,828, col. 6, lines 13-24. WO 00/52062 is in fact directed to catalysts which have the pentamethylcyclopentadienyl group. See e.g., U.S. 6,595,828, col. 5, line 17.

In WO 00/52062, and with regard to the catalysts which have the pentamethylcyclopentadienyl group, the yield of produced polymer is low, and the selectivity of 1,4-cis structure is not very high in comparison with the catalysts of the present invention. This is demonstrated in **Exhibit 1**, Kaita et al., *Macromolecules* **2003**, 36, 7923-7926. Exhibit 1 is an article co-authored by the present inventors.

In Exhibit 1 it is discussed how dramatic effects were observed upon modifying the pentamethylcyclopentadienyl group with the substitution of a larger alkyl group for one of the

methyl groups. See Exhibit 1, pp. 7923, col. 2, third line from the bottom, to pp. 7924, col. 1, line 6.

In Exhibit 1 catalysts **2-5** have a substituted cyclopentadienyl group represented as C_5Me_4R , wherein R is ethyl, isopropyl, n-butyl and trimethylsilyl, respectively. Catalysts **2-5** of Exhibit 1 correspond to the catalysts of the present invention. Catalyst 1 [$(C_5Me_5)_2Sm(THF)$] is the catalyst of WO 00/52062. Catalysts **2-5** are the catalysts of the present invention. [2: $(C_5Me_4Et)_2Sm(THF)$, 3: $(C_5Me_4Pr)_2Sm(THF)$, 4: $(C_5Me_4Bu)_2Sm(THF)$, 5: $(C_5Me_4TMS)_2Sm(THF)$]. See present Examples 1-4. For catalysts **2-5** of Exhibit 1, both the yield of produced polymer, and the selectivity for the 1,4-cis structure, are extremely high.

It should be noted that in Reference Example 1 of the present application, which uses catalyst 1, the yield of polymer is 95.2 wt% . On the other hand, in Exhibit 1 the yield of polymer using catalyst 1 is 21 wt%. Thus, the experimental results obtained in these two cases are considerably different. This is because the reaction time for the polymerization in the present application is longer (20 min) than that used in Exhibit 1 (10 min).

Therefore, when comparing the present Examples with the present Reference Example I, it should be noted that the polymerization time is long, i.e., 20 min. The polymerization reaction proceeds to such an extent that the difference in the yield and the 1,4-cis selectivity between the catalysts does not clearly appear.

However, in Exhibit 1 the polymerization reaction time is shortened to 10 min and catalysts **1-5**, which correspond to the catalysts of the Examples and the Reference Example 1 of the present application, are studied. In Exhibit 1, it is more clearly shown that there is a great difference in the effects of the catalyst activity based on the R group in the substituted cyclopentadienyl group of the catalyst, as shown in Table 1 in Exhibit 1.

Accordingly, Exhibit 1 demonstrates that the activity (yield and 1,4-cis selectivity) of the catalysts of the present invention are dramatically superior to the catalysts of WO 00/52062.

Also, in the Examples of the present application, cyclohexane is used as a solvent. On the other hand, in the Examples of WO 00/52062 toluene is used as the solvent. WO 00/52062 merely discloses cyclohexane as one of solvents which are able to be used for polymerization

Referring to Table I of Exhibit 1 at page 7924, and especially Run No. 1-5. In cyclohexane the yield of polymer by each catalyst are: **1**=21%, **2**=67%, **3**=~100%, **4**=88% and **5**=91%. 1,4-cis contents are: **1**= 96.2%, **2**=97.1%, **3**=98.6%, **4**=97.5% and **5**=98.6%. Thus as disclosed in Exhibit 1, the catalysts of the present invention show dramatic results when using cyclohexane as the solvent. This is not disclosed or suggested by the prior art.

In light of the present claim amendments and the comments given above, it is respectfully requested that this rejection now be withdrawn.

Conclusion

Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

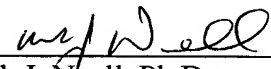
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 02-2448, under Order No. 1261-0153PUS1 from which the undersigned is authorized to draw.

Dated: September 16, 2005

Respectfully submitted,

By 
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Attachment: Exhibit 1